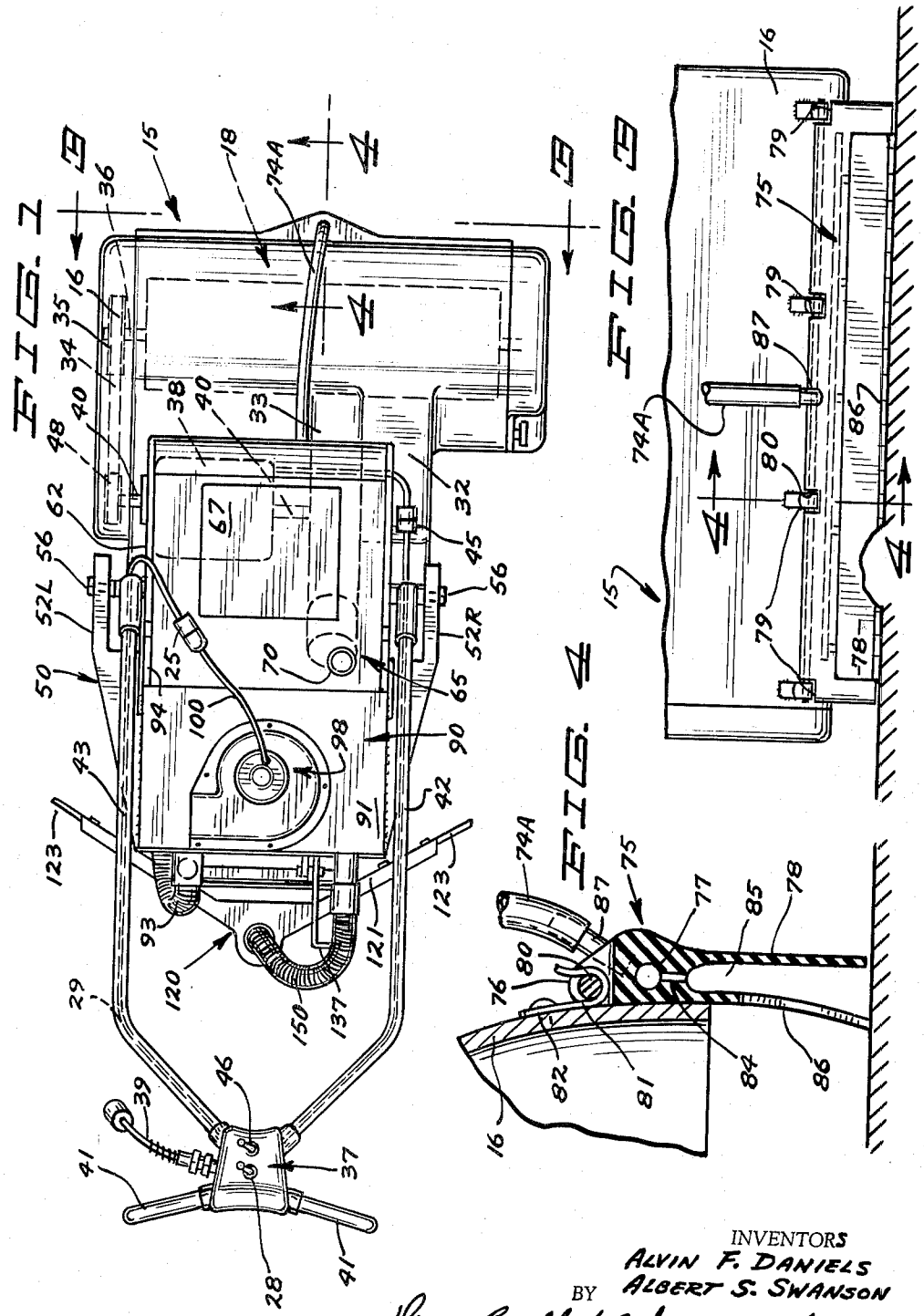
Sept. 21, 1965 A. F. DANIELS ETAL 3,206,787

SCRUBBING DEVICE

Filed Jan. 28, 1963

6 Sheets-Sheet 1



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FIG. 2

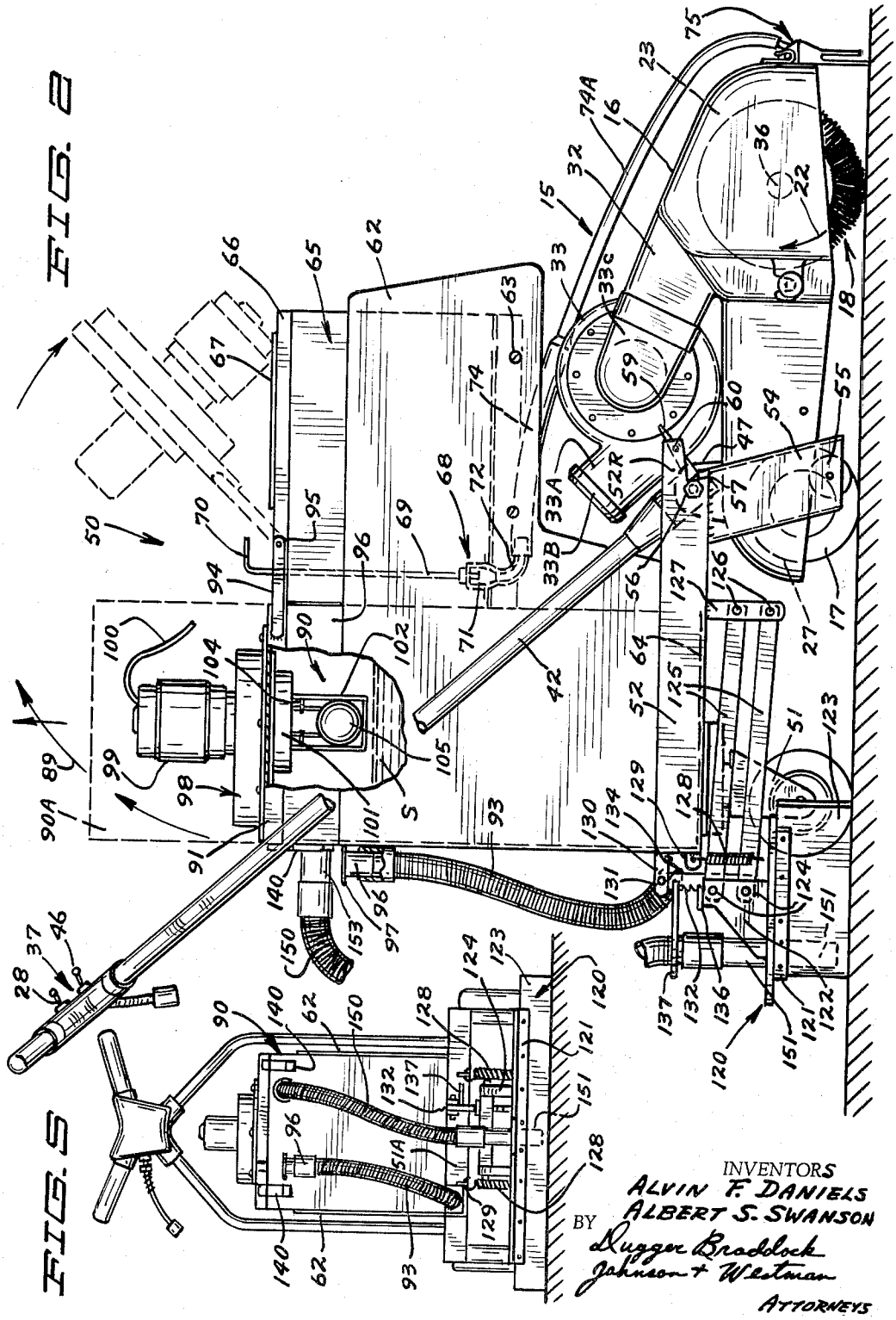


FIG. 5

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SCRUBBING DEVICE

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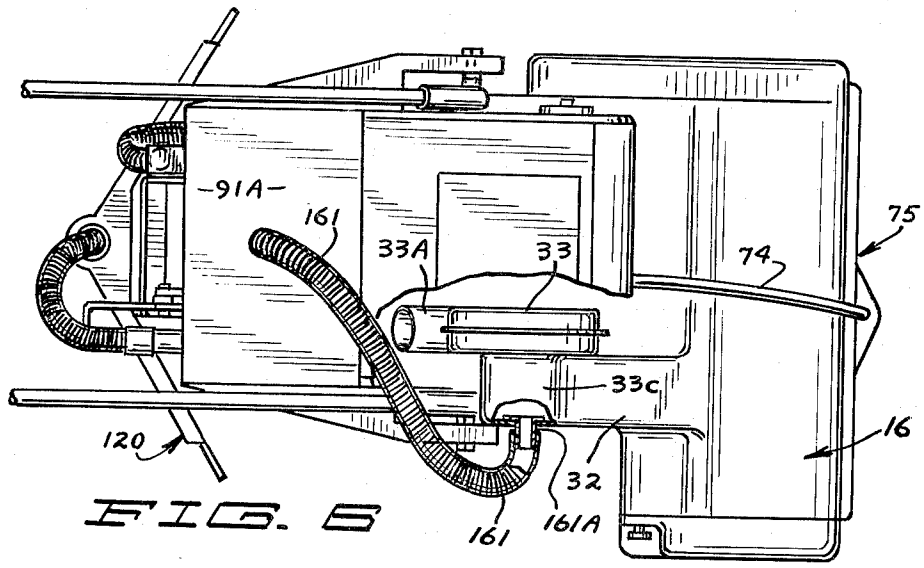


FIG. 6

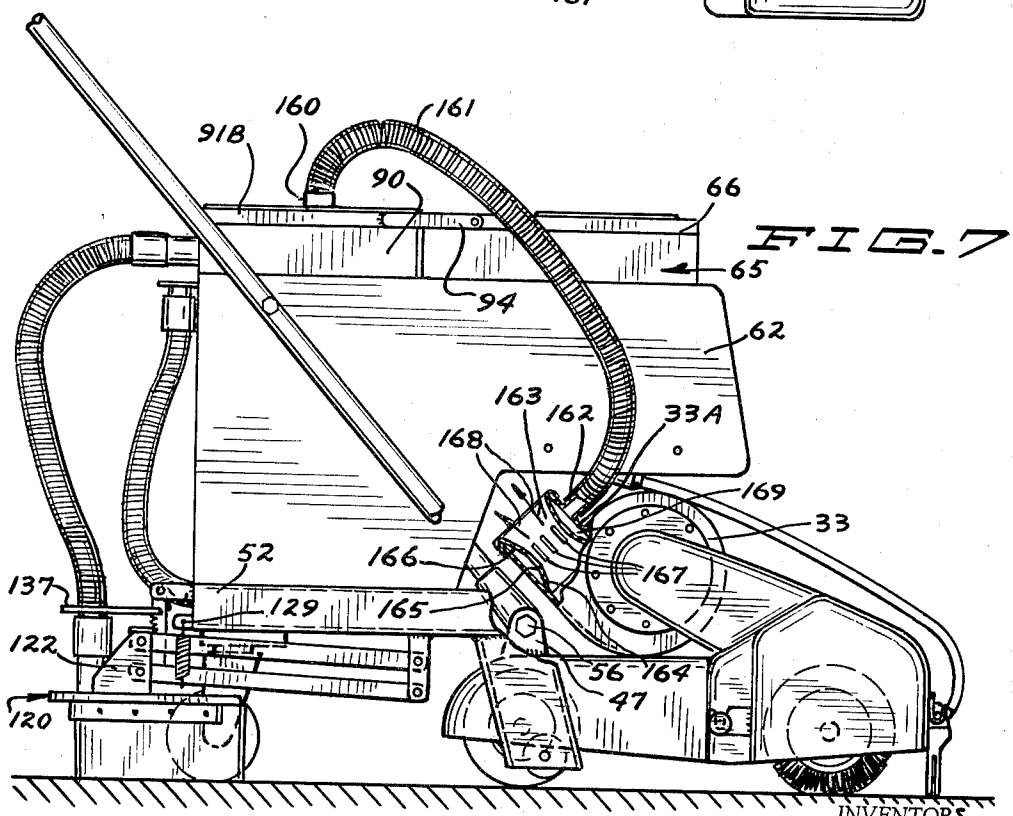


FIG. 7

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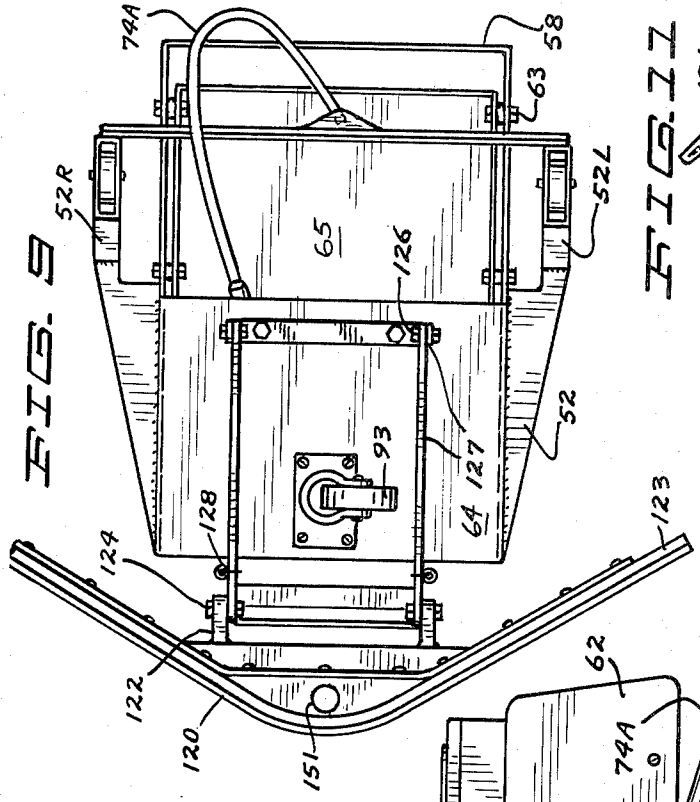


FIG. 9

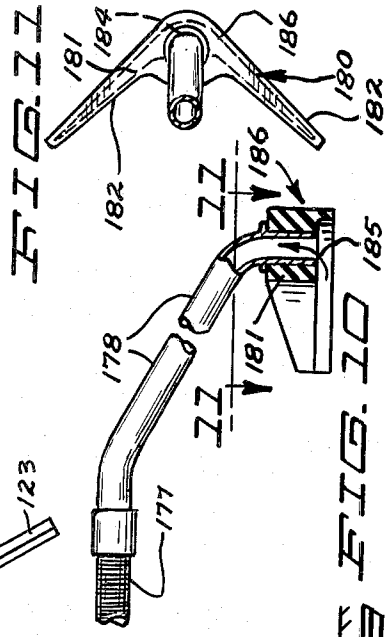


FIG. 11

FIG. 10

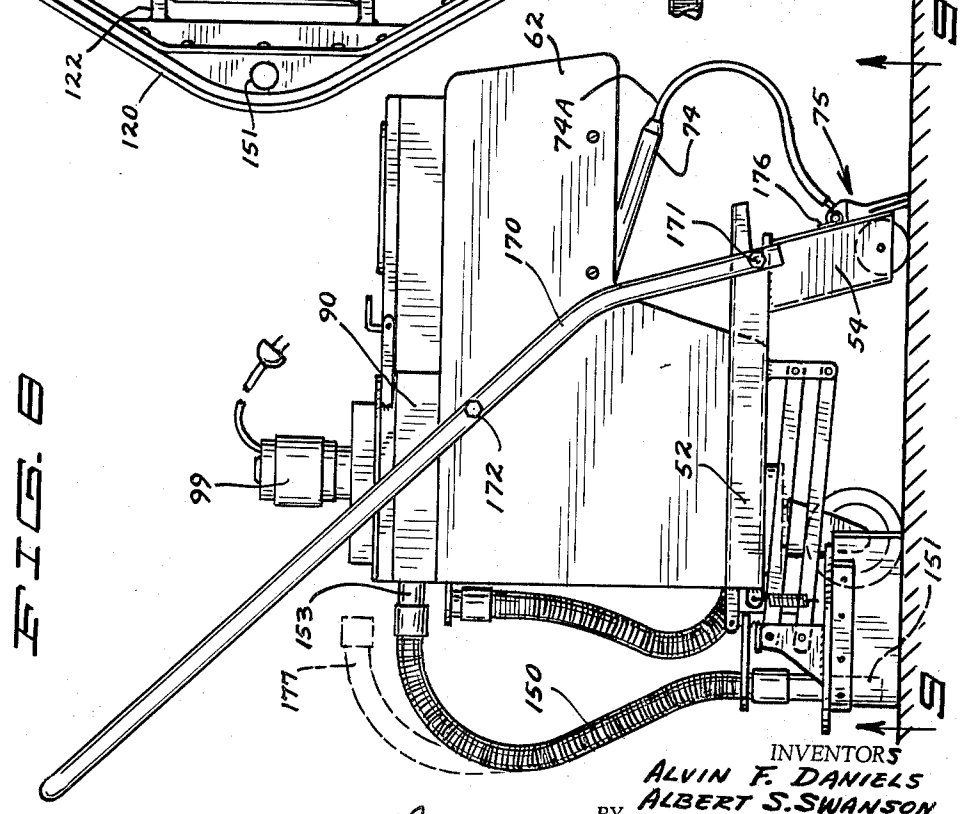


FIG. 8

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FIG. 12

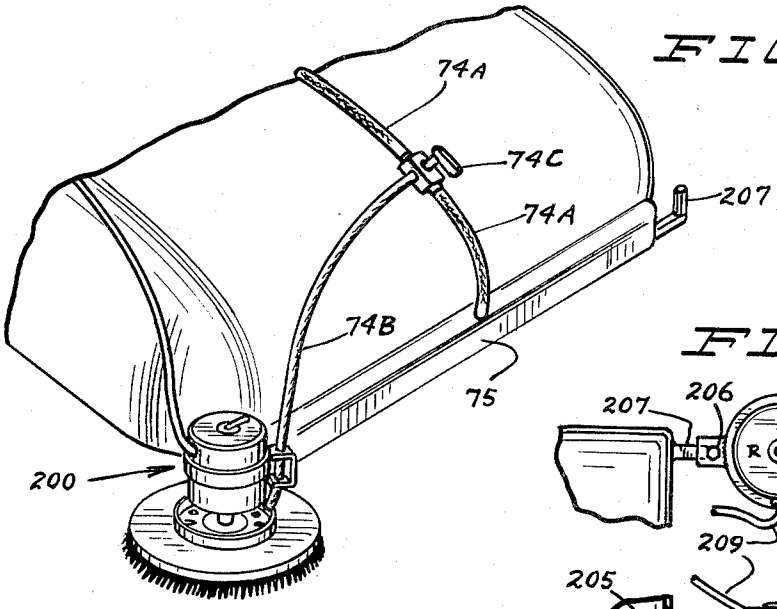


FIG. 13

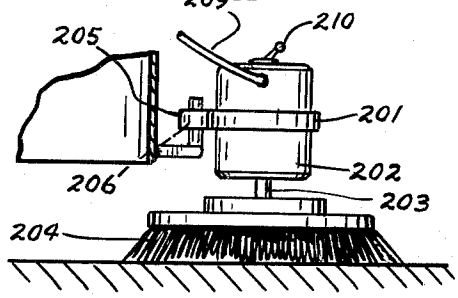


FIG. 14

FIG. 15

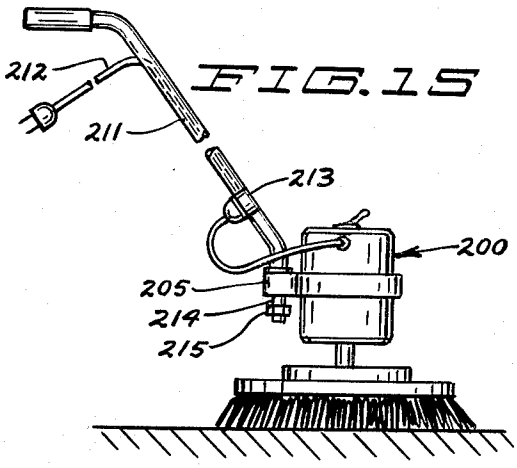
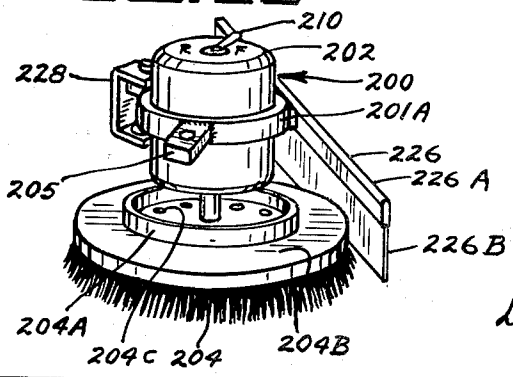


FIG. 16



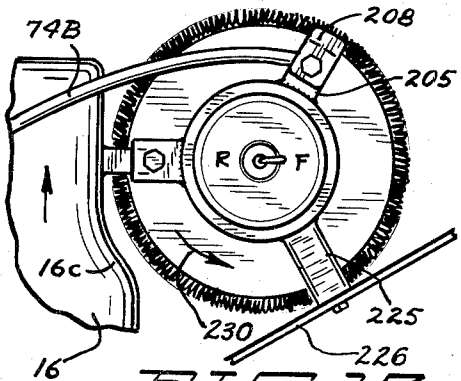


FIG. 17

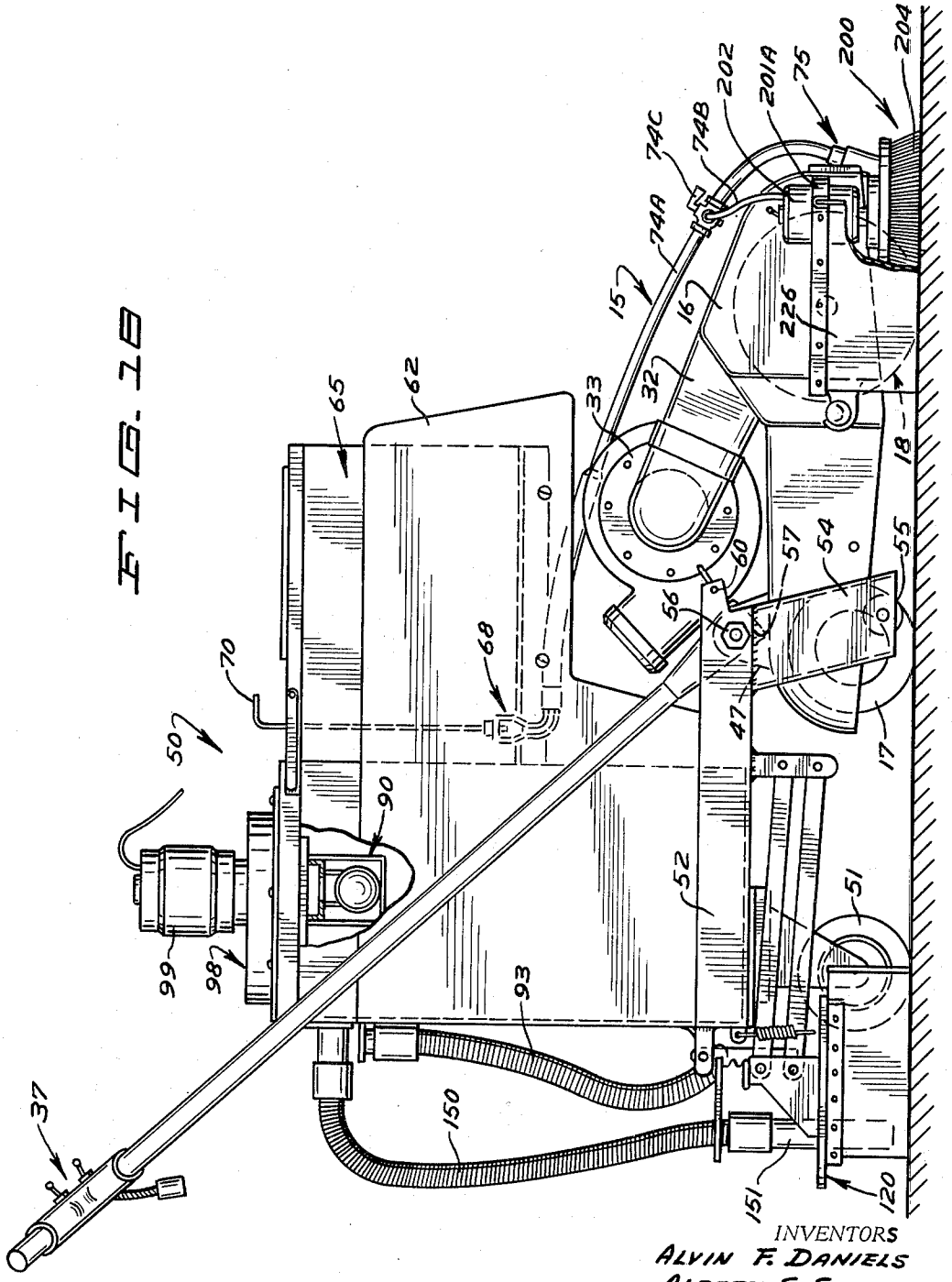
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FIG. 18



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3,206,787

SCRUBBING DEVICE

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Filed Jan. 28, 1963, Ser. No. 254,206
9 Claims. (Cl. 15—320)

This invention relates to a wet scrubbing unit, which may be used independently or as an attachment. As an attachment, the wet scrubbing unit is made so that it can be used with a floor maintenance machine of known construction that is normally used for dry maintenance operations such as the sweeping and polishing floor maintenance machine illustrated in Patent No. 2,862,224, the disclosure of which is incorporated herein by reference.

It has been found that, utilizing a brush as the working tool, in a floor maintenance machine such as that covered by Patent No. 2,862,224, that the floor maintenance machine, which ordinarily is used for dry-maintenance operations, will also provide a good wet scrubbing action when the surface on which the machine is used is wetted with suitable wet scrubbing solution. Patent 2,879,534 provides a bristle brush construction which is capable of being used under both dry and wet conditions (interchangeably). Accordingly, by using a cylindrical brush made according to Patent 2,879,534, in the floor maintenance machine shown in Patent 2,862,224, one has available a basic machine which can be used interchangeably under both dry and wet conditions, and hence may be used not only for sweeping and polishing but also for wet scrubbing operations.

It is an object of the present invention to provide a new and novel attachment especially adapted for use in a floor maintenance machine such as the sweeping-polishing machine covered by Patent 2,862,224, which by utilizing the wet scrubbing attachment provides a combined machine that may be then used for wet scrubbing of floors and other wet-surface operations. It is a further object of the invention to provide a wet scrubbing machine attachment which has self-contained tankage components for carrying a clear scrubbing liquid supply and for carrying the recovered used scrubbing liquid after returning it from the floor together with components for distributing the clean scrubbing liquid and for recovering the used scrubbing liquid. It is another object of the invention to provide a self-contained unit which may be utilized as a wet pickup for collecting liquid from a surface over which it is propelled and for elevating such liquid and storing it in a tank on the unit. It is a further object of the invention to provide a wet-scrubbing attachment having a used scrubbing liquid storage tank, a self-contained clean scrubbing liquid storage tank, together with provision for dispensing the clean scrubbing liquid at proximate or remote locations and means for collecting and recovering the used scrubbing liquid from the surface being scrubbed.

It is a further object of the invention to provide a wet-scrubbing attachment which may be used alone or in conjunction with a floor maintenance machine normally used for dry maintenance operations and having a used scrubbing liquid storage tank, with self-contained used liquid gathering devices and vacuum system for gathering and collecting the used scrubbing liquid and in such machine to provide for the easy removal of such used scrubbing liquid from its storage tank for emptying and cleaning. It is another object of the invention to provide a new and novel scrubbing unit having a clean scrubbing liquid supply tank and used scrubbing liquid storage tank with provision for inducing a negative pressure in the latter tank for sucking used scrubbing liquid thereinto as

it is recovered and in connection with such unit to provide a remote operator controlled power driven scrubbing unit with means thereon for dispensing clean scrubbing liquid at such remote unit, for accumulating and recovering the used scrubbing liquid, and then carrying back the used scrubbing liquid to the used scrubbing liquid storage tank of the scrubbing unit.

It is another object of the invention to provide a floor scrubbing attachment for a floor maintenance machine having an enclosed revolving brush and vacuum blower, wherein the vacuum blower of the floor maintenance machine is used in the floor scrubbing attachment for vacuum pickup of collected used floor scrubbing liquid.

Other and further objects are those inherent in the invention herein illustrated, described and claimed and will be apparent as the description proceeds.

To the accomplishment of the foregoing and related ends, this invention then comprises the features hereinafter fully described and particularly pointed out in the claims, the following description setting forth in detail certain illustrative embodiments of the invention, these being indicative, however, of but a few of the various ways in which the principles of the invention may be employed.

The invention is illustrated with reference to the drawings wherein:

FIGURE 1 is a plan view of a floor maintenance machine of the type covered by Patent 2,862,224, with the dust bag thereof removed and having the scrubbing unit of the present invention in an operating position;

FIGURE 2 is a right-side elevational view of the machine as shown in FIGURE 1;

FIGURE 3 is a fragmentary front elevational view of the machine showing principally, the scrubbing liquid distributor portion of the scrubbing unit as mounted on the floor maintenance machine, FIGURE 3 being taken along the line and in the direction of arrows 3—3 of FIGURE 1;

FIGURE 4 is a fragmentary longitudinal sectional view through the scrubbing liquid dispensing means shown in FIGURES 1 and 3, FIGURE 4 being taken along the line and in the direction of arrows 4—4 of FIGURE 3;

FIGURE 5 is a rear elevational view of the structure shown in FIGURES 1 and 2;

FIGURE 6 is a plan view of a slightly modified form of the invention, portions of the machine being broken away;

FIGURE 7 is a right-side elevational view of another modified form of the invention;

FIGURES 8 and 9 show another slightly modified form of the invention wherein the scrubbing attachment is used independently as a scrubbing liquid pickup for collecting used scrubbing liquid that is on the floor or other surface on which the device is moved, and storing the same, FIGURE 8 being a side elevational view that in dotted lines illustrates the collection take up tube being disattached, FIGURE 9 a bottom view taken along the line and in the direction of arrows 9—9 of FIGURE 8;

FIGURES 10 and 11 show a portable hand held tool to be used in conjunction with the scrubbing unit shown in FIGURE 8, for collecting and elevating used scrubbing liquid, FIGURE 10 being a side elevational view and FIGURE 11 a plan view. FIGURE 11 is taken as a sectional view at the line and in the direction of arrows 11—11 of FIGURE 10;

FIGURES 12 through 14 illustrate a form of scrubbing attachment for use on the scrubbing machine shown in FIGURES 1, 6 and 7. This attachment is a "baseboard" or a "curb scrubbing brush" attachment. FIGURE 12 is a fragmentary isometric view showing such

"baseboard" or "curb" scrubbing brush attachment positioned on the front right corner of a scrubbing machine of the type shown in FIGURES 1, 6 and 7;

FIGURE 13 is a fragmentary plan view and FIGURE 14 is a fragmentary side elevational view of the "baseboard" or "curb" scrubbing brush of FIGURE 12;

FIGURE 15 is a side elevational view of the "baseboard" or "curb" scrubbing brush of FIGURES 12–14 mounted on an operator held handle for independent use;

FIGURES 16 and 17 show a slightly modified form of the "baseboard" or "curb" scrubbing attachment wherein a self-contained squeegee is provided. FIGURE 17 is a fragmentary plan view of the front right corner of the scrubbing machine shown in FIGURES 1, 6 and 7 illustrating the brush-squeegee attachment mounted on the main machine, the end portions of the squeegee being broken away; and FIGURE 16 is an isometric view of the device shown in FIGURE 17 removed from the main scrubbing machine; and FIGURE 18 is a view of a scrubbing machine similar to FIGURE 2 together with the scrubbing attachment of FIGURES 16 and 17 removably mounted thereon.

Throughout the drawings, corresponding numerals refer to the same parts.

Referring to the drawings, and particularly to FIGURES 1–5, there is illustrated a floor maintenance machine generally designated **15** including a housing **16** supported upon wheels **17**. There is one wheel on each side of the housing at a rear portion thereof. The housing is provided with a rotating working tool, which, according to U.S. Patent No. 2,862,224, may be any one of a number of different types of tools. In the present situation, this rotating tool, generally designated **18**, is a bristle brush, which as previously mentioned, can conveniently be constructed according to Patent 2,879,534; and when so made, the brush may be used with equal facility under dry or wet conditions. Although member **18** is described as a bristle brush it is to be understood it could be an abrasive roll or any other floor maintenance device suitable for the particular requirements. The brush **18** is situated in a brush compartment **23** at the forward portion of the housing **16** and wheels **17** are situated in wheel compartments **27** on the rear part of the housing. The construction is fully explained in Patent 2,862,224, aforementioned.

The brush compartment **23** of the housing **16** includes an upwardly and rearwardly directed hollow extension **32** which is spaced somewhat from the center line of the machine. This extension is a hollow tube leading from the brush compartment **23** and it leads directly into the inlet of the suction blower **33**.

This suction blower has an outlet **33A**, which is normally connected to a dust collecting bag as shown in Patent 2,862,224. In the present situation this outlet is capped by means of a slip-on rubber or plastic cap **33B**. The suction blower **33** therefore does not move an appreciable mass of air, and its power requirements are thereby reduced. The suction blower **33** is connected directly to one end of the shaft **40** of the electric motor **38**, the other end of the shaft being provided with pulley **48** which is connected by belt **34** to pulley **35** on shaft **36** of the brush **18**. The brush **18** is thereby driven by motor **38**. On the rear portions of the wheel housing **27** there are handle supporting brackets **47** on which the tubular handle members **42–43** are pivotally attached by suitable pivot bolts **56**. As shown in FIGURE 1, the handle members **42** and **43** are spaced apart and they extend upwardly and rearwardly to converge at their upper ends to a handle assembly generally designated **37** which has hand grips **41—41**. The handle assembly has an electric powered cord **39** entering it, and it is provided with a switch **46** for turning on and off the power to the motor **38**. The wiring from the switch passes down through the

tubular handle **42** and thence goes through a connector **45** and continues on to the motor **38**. According to this invention an additional switch **28** is provided on the handle assembly **37** and from this a pair of electric power lines **29** are extended down through the tubular handle member **43** where they terminate as a plug connector **25** for purposes to be described.

The brush **18** has a sufficient bristle stiffness so that it will support the front end of the machine **15**, the rear end of the machine being supported on the wheels **17**. The brush **18** rotates in the direction of arrow **22** and has a tendency to pull the machine **15** forward, but this tendency can easily be overcome by a slight holding back by the operator on the handles **41—41**. Thus guiding of the machine is easily accomplished by means of the handles **41—41**.

This much of the floor maintenance machine, of Patent 2,862,224 is utilized in conjunction with the present invention for wet floor-scrubbing operations. To accomplish this purpose a scrubbing attachment is provided, which is shown generally at **50**. This attachment includes a base frame **52**, which is provided at it rear end with a castor-wheel **51**. The frame extends forwardly and outwardly at **52R** and **52L**, so as to have a width which is wider than the handles **42–43** of the floor maintenance machine where they are attached onto the housing **16**. These portions **52R**, **52L** of the scrubbing attachment frame **52** are each provided with a downwardly extending leg **54**, which has a wheel on it at **55**, and hence the attachment **50** is self-supporting when it is detached from the floor maintenance machine **15** and may be steered since the wheel **51** is a castor wheel. This facilitates moving the unit about, either for placing it in storage, or for using it as an independent unit as will be described.

The bolts **56—56** which normally hold the handle **42–43** to the lugs **47** of the floor maintenance machine, are extended outwardly, and the frame portions **52R** and **52L** are each provided with a forwardly opening, upwardly sloping notch as at **57**. This notch is shaped so as to be received upon the bolts **56**, and when so received, the wheels **55** on the legs **54** will be slightly elevated above the surface of the floor. Thus the entire attachment **50** is coupled as a trailer on the machine **15**, the front part of the weight of unit **50** being transferred to bolts **56** and hence to wheels **17** of machine **15**. The balance of the weight is upon castor wheel **51**. It will be noted that the notch **57** has a slight upward inclination and hence when the floor maintenance machine **15** and scrubbing attachment **50** are brought together for coupling the edge of the notches **57** will slide up on the bolts **56**, thereby gradually but slightly elevating the legs **54** and wheels **55** off of the floor as the connection is made. In order to prevent the frame **52** of the scrubbing attachment machine from disengagement from connection with the bolts **56**, each of the frame portions **52R** and **52L** are provided with a small lever as at **59**. These levers **59** are pivoted at **60** on the frame pieces **52R** and **52L** and being loosely pivoted and overweighted at their rear ends (left end as shown in FIGURE 5) the lever **59** will fall down to a position where they will form stops against the forward movement of the bolt **56** from the slot **57**. Of course when it is desired to disconnect the unit **50** it is only necessary to press down on the front ends of the levers **59** and the bolts **56** are then free to slide out of the notches **57**.

On the frame **52** thus provided there are mounted sidewalls **62** connected by a rear floor **64—64** and front wall **58** (see FIGURE 9). A complete rectangular tank **65** has depending flanges that are notched to have the notched portions seat on stud bolt members **63** mounted on the sidewalls so as to be mounted on tank **65** for removal. This tank **65** is a storage tank for the clean scrubbing solution. Tank **65** has a top **66** which in turn

has a lift cover 67 on it to provide a filling opening. The tank 65 is provided with an outlet which is in the form of a flow control and shut-off valve 68 having a control rod 69 reaching up to a handle portion 70 that may be turned by the operator. When the control rod is turned to the right the valve plug 71 on rod 69 is screwed down to its seat thereby shutting off the flow of the scrubbing liquid out of the outlet 72. By screwing back on the control rod the plug 71 is unseated to any desired position thereby metering the flow of scrubbing solution out of the outlet 72. The scrubbing solution is conveyed from the outlet to a hose 74 which extends forwardly at 74A to a scrubbing solution distributing header generally designated 75.

Referring to FIGURES 3 and 4, the distributing header 75 is composed of a rubber extrusion having holes 76 and 77 in it, and downwardly extending flaps 78 and 86. Flap 86 is longer and is slitted at intervals along its length. Notches 79—79 are cut into the extrusion so as to intersect the upper hole 76 and a rod 80 may then be inserted through hole 76. The rod 80 can be hooked onto the hooks 81, as shown in FIGURE 4, these being fastened by screws 82 to the front of the housing 16 of the floor maintenance machine. In this way the distributing header 75 is suspended from the machine.

The hole 77 acts as a header and is tapped by making a plurality of intersecting holes 84 which extend down thru the rubber to the space 85 between the flaps 78 and 86. These are drain, or outlet holes for the fresh floor scrubbing liquid. The header hole 77 is also intersected by an inlet tube 87 which is connected to the tube 74A, through which the scrubbing liquid is delivered to header hole 77. The outer ends of the hole 77 are then plugged and any liquid delivered by the tube 74A will enter the header hole 77 and be dribbled out through the outlet holes 84. The liquid is thus fully distributed across the front of the machine. The header 75 is a replacement for the ordinary rubber flap which is normally on the front of the floor maintenance machine.

On the frame structure 52–62 described, there is also provided space for a completely removable used (dirty) scrubbing solution collection tank, generally designated 90. This tank is made so that it slips down neatly between the walls 62—62 onto floor 64 where it is held from rearward displacement by a small bottom flange on frame 52. The tank 90 has a removable lid 91 adequately gasketed on the under side where it fits tank 90. Lid 91 is supported by arms 94 extending forwardly where they are pivoted at 95 on the top of the tank 50. The entire lid 91 of the tank 90 may thus be swung up as per arrow 89 to the dotted line portion shown in FIGURE 2, and when in this position the entire container portion of tank 90 can be lifted out from its position between the wall 62—62 and emptied or hosed out for cleaning. A pair of snap-down buckles 140 are provided to hold lid securely in vacuum tight relation on the rest of tank 90.

The tank 90 has an outlet hose 93 which connects at its lower portion to a tubular outlet in the back wall of tank 90. This outlet hose, which is a drain hose, has a "parking" position which is nothing more than a closed end pipe 96 mounted on a bracket 97 protruding from the rear part of the tank 90. The pipe 96 is closed because it is desired to prevent in-leakage of air through the pipe tube 93 when the tank 90 is under vacuum conditions.

Tank 90 also has an inlet 153 in the upper rear portion of the tank wall. This is connected to a flexible hose 150 extending down to squeegee 120, as will be described. Hose 150 is a suction inlet hose.

The cover 91 of the tank 90 is provided with a vacuum blower, generally designated 98, driven by an independent electric motor 99 served by the powder cord 100. This vacuum blower has its inlet plenum extending through a cover at 101, and the inlet is protected by a frame 102 which has an aperture 104 in it. The frame,

below the aperture, is merely composed of a plurality of light rods, which serve loosely to position a ball 105 of hardened foam plastic. This ball 105 is so light that it will float on soapy foam which may be formed by the recovered scrubbing solution which is collected in the tank 90. If the solution S or the foam therein lifts the ball 105, it will close the opening 104 to the vacuum blower 98, thereby preventing the foam from being drawn through by the vacuum blower 98.

The electric power supply cord 100 for the vacuum blower motor extends down to the connector 25, see FIGURE 1, and the power to this connector is controlled by the switch 28 in the handle assembly 37. Accordingly the vacuum blower may be conveniently controlled by the operator.

For recovering the used and dirty scrubbing solution from the floor over which the combined machine 15–50 passes, there is provided the squeegee arrangement generally designated 120, see FIGURES 1 and 2. This squeegee is composed of members 123 that may be of a rubber composition mounted by a V-shaped frame 121 having brackets 122 thereon providing pivots 124. Parallel links 125 are connected to pivots 124 and reach forward to the pivots 126—126 on a bracket 127 extending down from the scrubbing unit frame 52. A pair of springs 128 connect between the brackets 129 on the frame 52 and the frame 121 of the squeegee unit. The springs 128 have sufficient tension to support the squeegee unit off the floor.

On the frame 52 there is a rearwardly extending bracket 130 having a pivot pin 131 on which there is a downwardly extending ratchet 132. A spring 134 is provided between the frame 52 and the ratchet 132. The ratchet has rearwardly extending teeth which engage a corresponding detent plate 136 on the bracket 122. The ratchet plate also has a foot pedal portion 137 which extends rearwardly. When it is desired to push the squeegee downwardly it is only necessary to place the foot on the frame 121 and press down. This overcomes the upward pull of the springs 128 and the squeegee will be lowered to the floor. It is held parallel to the floor by the parallel links 125 but sufficient transverse and lateral tipping is permitted to accommodate floor irregularities. The squeegee will be held in any adjusted downward position by engagement of one of the notches on the ratchet plate 132 with the detent 136, it being noted that the ratchet plate is always pushed in a direction to engage the detent due to the action of spring 134. When it is desired to raise the squeegee it is only necessary to press downwardly on the pedal 137. This releases the ratchet from the detent plate and the springs 128 lift the squeegee.

In using the scrubbing unit attachment, it is only necessary to first remove the normal dust collecting bag which is connected to the outlet 33A of the vacuum blower 33, and in order to save power, a cap 33B is then placed on this outlet. This leaves a space between the handles 42 and 43 and the floor maintenance machine 15 is then backed into a position so that the bolts 56 will engage the notches 57 and after riding into their full coupled position, the bolts latch into place as shown in FIGURE 2. The vacuum blower electric connection is then made at 25. The normal rubber skirt on the front of housing 16 is then removed and the liquid distributor header arrangement shown in FIGURES 3 and 4 is then hooked onto the hooks 81 and the hose connection 74 is made. Tank 65 is then filled with floor scrubbing solution. Tank 90 is empty. The latch buckles 140 are fastened down so as to hold the top 91 of the tank firmly in place. The operator then opens the valve 68 by unscrewing the rod 69. This allows fresh cleaning solution to be flown down the tube 74 through the header 75 and be dribbled onto the floor. The switch 46 is then put to the "on" position and the brush 18 will revolve and will cause the machine to creep forward. The sweeping (now scrubbing), ef-

fect of the bristles on the floor produces enough forward propulsive effort to pull the entire combined unit (consisting of the scrubbing attachment **50** attached to the floor maintenance machine **15**) forward. Control of speed and direction can be exercised by the operator by control of the handles **41—41**. The switch **28** is also turned on and the operator pushes down on the squeegee assembly **120** so that it is in engagement with the floor. The operator then proceeds forwardly. Suction induced in tank **90** is communicated through the connection **153** and hose **150** from the top of tank **90** down to the tube **151** (which extends through frame **121**) and into a position closely adjacent the floor just forwardly of the apex of member **123**. A generous amount of air will enter into the open lower end of the tube **151** and will cause water which is moved by the V-shaped squeegee to the rear apex portion of the squeegee to be sucked up through the hose **150** and be delivered into the tank **90**. The operation can be continued until the floor scrubbing liquid is exhausted or until the tank **90** is full. The tank **90** is preferably made so as to have a somewhat larger capacity than the tank **65**.

When it is desired to empty the tank **90**, it is only necessary to unfasten the bucklets **140—140** and swing the entire lid structure **91** (including blower **98**) to the dotted line position shown in FIGURE 2. The tank **90** is then disconnected at hose **150** and tank **90** can then be bodily lifted from its position between the walls **62—62** (dotted line position **90A** to FIGURE 2 showing it partially lifted) and can be emptied (hosed for removal of any solids that may have settled to the bottom of the tank).

In FIGURE 7 the structure is identical with that shown in FIGURES 1–5 except for the following changes. The vacuum blower **98** and motor **99** are removed and a modified cover **91B** for the tank **90** is provided with a suitable outlet **160** to which a hose **161** is connected. This hose leads down to a connection **162** which is made into the side of the outlet tube **33A** of the vacuum blower **33** (being illustrated at top of FIGURE 7 for convenience). Cap **33B** is not used, and into the open end **33A** there is slipped a venturi-shaped fitting, generally designated **163**, which can be made of metal or plastic. This fitting can be fastened in place by screws or clips and has a smoothly rounded entrance throat at **164** which begins in contact with the interior surface of the outlet tube **33A**. The unit **163** then extends down to a constricted portion **165** and thence is gradually enlarged at **166** to the outlet where air discharges. At the throat or constricted portion **165** there are provided a plurality of apertures **167** which lead into the annular space **169** between the unit **163** and the interior surface of the outlet tube **33A**. The outflow of air through the blower **33** as shown by the arrows **168** induces a negative pressure at the constriction **165** and this draws air through openings **167**, which communicate back to the space **169** of the unit **163** and the outlet tube **33A**. This negative pressure, and flow of air due to it is then communicated from the annular space **169** to the tube **161** and through it to the inside of tank **90**. Thus a vacuum is induced into tank **90** by utilizing the power of the blower **33A** rather than by utilizing a separate motor-driven vacuum blower.

Referring now to FIGURE 6 the machine is the same as that shown in FIGURES 1–5 with the modifications of FIGURE 7 except that in this instance no fitting **163** or outlet **162** is provided and the hose **161** is connected down to connector **161A** which in turn is mounted on the inlet **33C** of the vacuum blower **33**, to open thereto and thus utilizes the negative pressure at this location for inducing a vacuum in the tank **90**. In FIGURE 6 embodiment no cap **33B** is provided.

Referring now to FIGURES 8 and 9, the floor scrubbing machine therein illustrated is the same as that of FIGURES 1–5 other than for the modifications set forth hereinafter to permit it being used separate from unit **15**. To facilitate using the unit of FIGURES 8 and 9 separately and moving it, there are provided independent handles **170** that are attached to walls **63** by bolts **172** and bolts **171** for attaching the lower ends of the handles to the notched portions of the frame. A suitable power connection is provided for operating vacuum blower motor **99** (FIGURE 8) to provide a negative pressure in the tank **90**. The clean floor-scrubbing liquid distributing header **75** is then fastened to brackets **176** that are placed on the front legs **54** of the floor scrubbing unit, and liquid is then distributed onto the floor where it spreads. No scrubbing is involved in this usage. The liquid is then merely distributed on the floor and then squeegeed off to common collection point by the squeegee and lifted via the tube **151** and **150** into the collection tank. Where there is little soil on a smooth floor this method of cleaning has many advantages.

The unit shown in FIGURES 8 and 9 may also be used as a liquid pick-up unit for any situation in which liquid is on a floor, for example where companion machines are used to do the scrubbing or the liquid is left by a hand operated scrubbing tool, such as shown in FIGURE 15, to be described. Thus assuming that the floor has been scrubbed by some independent method, and it is desired to lift the dirty scrubbing liquid from the floor, it is only necessary to push the machine shown in FIGURES 8–9 along the floor and the liquid will be gathered by the squeegee assembly **120** and picked up into the tank.

Also the unit **50** as shown in FIGURES 1–5, or 6–7 or 8 and 9 may be used with a hand-wand vacuum pick-up squeegee such as shown in FIGURES 10 and 11. In this situation a long vacuum hose such as hose **177** of FIGURE 10 is connected to the vacuum fitting **153** of tank **90**, in place of a hose **150**. The hose **177** (FIGURE 10) connects to a tubular handle **178** which extends down to a small V-shaped rubber squeegee fitting generally designated **180**. This squeegee fitting is a rubber molding and includes a central frame which the squeegee wings **182—182** extend. The handle **178** fits into an aperture **184** in the central block. The aperture extends close enough to the floor so that air entering through the aperture via arrows **185** will entrain moisture accumulated in the space under the central V-portion **186** of the squeegee and lift the moisture up into the rubber handle **178** and thence carry it through the flexible tube **177** and into the entrance tube **153** of the vacuum tank **90**. Accordingly when it is desired to work in close spaces, as in the corners of hospital rooms and the like, the hand-held vacuum squeegee is shown in FIGURES 10 and 11 can very conveniently be used with the machine shown in FIGURES 8–9 (or with an entire scrubbing machine combination of units **15** and **50** shown in FIGURES 1–5) for picking up moisture from restricted places where the combined machine cannot operate.

Referring to FIGURES 12 through 15, there is illustrated another adjunct of the invention. According to these figures there is provided a small detachable "curb" or "baseboard" rotary scrubbing brush generally designated **200**. This unit consists of a frame **201** which carries a motor **202** on the shaft **203** of which there is mounted a small circular disk scrubbing brush **204**. The motor is directly connected but it may be geared, if desired, so as to keep the speed low. The frame **201** is provided with one or more protuberances **205** which have a hexagonal or other non-circular aperture **206** therein. The aperture is shaped and so oriented so that it can be fitted upon a similarly shaped hangar lugs **207**, one lug **207** being mounted on each corner of the floor sweeping machine generally designated **15**, of which the front part of the housing **16** is shown in FIGURE 13. One of these brackets **207** is preferably located on each of the corners and the upstanding non-circular cross-sectioned portion of lug **207** thus provides a convenient mounting for the frame **201** of the scrubbing unit **200**, which can accordingly be positioned on either front corner

of the machine. Power to the motor 202 is supplied by an electric cord 209 through a reversing switch 210. The cord is run back to a double plug, which is in this situation, inserted at plug 25, see FIGURE 1. Power is thus made available to the small rotary "curb" or "baseboard" scrubbing brush on the front of the machine and this greatly adds to its utility.

The liquid supply for brush 200 is via a branch tube 74B connected back to line 74A through a three position valve 74C in line 74A. The manner of supplying liquid to the brush and further details of instruction of the brush and liquid supply will be set forth relative to structure of FIGURES 16 and 17.

In some situations however, even a "curb" brush, mounted as shown in FIGURE 12, will not reach all of the far corners of a room or space and in order to accomplish this there is, according to FIGURE 15, provided a handle device 211, which is supplied with an electric cord 212 extending down through the handle to an outlet box 213 at the lower end of the handle. This handle has a lower terminal end 214 which is shaped to fit the non-circular opening 206 in the bracket 205 of the scrubbing unit 200 and then on the lower end of this portion of the handle there is provided a removable nut or clip at 215 which merely serves to hold the scrubbing unit in place, when it is on the handle. The electric power cord of the scrubbing unit 200 is connected to the outlet box 213 on the handle and the cord 212 is plugged into a double plug connection at the plug 25 of the main unit. Scrubbing liquid is supplied manually. The operator can then use the motor-powered small scrubbing unit to work into corners, under beds, or in other difficult spaces which cannot be reached by the combined machine composed of units 15 and 50. In such cases an extension hose may be provided at the end of hose 74B.

Then, in order to pick up the liquid left by such scrubbing operation it is only necessary to use a squeegee attachment, such as shown in FIGURES 10–11, and the liquid in these hard-to-reach places can then be squeegeed by hand to accumulate it, and the liquids sucked up through the vacuum hose and collected in the tank 90.

If desired, a platform may be provided on the scrubbing attachment for supporting batteries for powering the motor 38. Such a battery-operated unit has certain advantages where it is undesirable or not practical to have an electric cord for powering the unit.

Referring now to FIGURES 16 and 17, the structure thereof is the same as that of FIGURES 12–14 except for the differences set forth herewith. In FIGURES 16 and 17 the unit 200 includes a motor 202 mounted on frame 201A that includes a plurality of apertured projections 205 for removably attaching unit 200 to hanger bracket 207 on the front corner of the frame. A projection 225 is provided on frame 201A for mounting the squeegee attachment 226 that includes a frame 226A and squeegee member 226B. By providing two projections 205 and one projection 225 that are 120 degrees angularly spaced relationship, unit 200 may be attached to either front corner of the housing 16 to direct scrub water of brush 204 under housing 16, the squeegee 226B being rearwardly and inwardly inclined by placing the appropriate projection 205 on the respective hanger 207. Preferably each front corner portion of the housing in plan configuration is curved as shown at 16C.

To provide liquid for the brushes of unit 200 of each of FIGURES 12 and 16, preferably an annular flange 204A is provided in top of the brush plate 204B to surrounding a plurality of apertures 204C is the brush plate that opens to a hollow center space surrounded by the brush bristles. Also provided is a bracket 228 having a projection that extends into a projection 205 (one other than that mounted on lug 207) and a hose clamp for holding the hose 74B with its outer end above the aperture portion of brush plate 204B. To supply liquid to only one brush 204, valve 74C is turned to one position; for supplying liquid to both header 75 and brush 204 to a second position; and for supplying liquid to neither header 75 or brush 204, to its third position. It is to be mentioned that hose 74B is of sufficient flexibility so that it may be used at either front corner portion of housing 16.

By attaching hose 74B to bracket 228 and opening the valve 74C to live 74B liquid is provided in front of brush 204 to be worked by said brush as it revolves in the direction of arrow 230 if attached to the right front corner (opposite direction of attached to the other corner) and then this scrub liquid is directed by squeegee 226 to a position in front of brush 18 as the unit 15 is moved in a forward direction. The direction of rotation of brush 204 is controlled by the reversing switch.

As many widely apparently different embodiments of this invention may be made without departing from the spirit and scope thereof, it is to be understood that we do not limit ourselves to the specific embodiments herein.

What is claimed is:

1. Apparatus for maintaining floor surfaces and the like comprising a floor maintenance machine having an operator handle guide wheel-supported frame, a drive motor on the aforementioned frame, a brush drivenly connected to said motor on the machine frame mounted for rotation and mounted so that the brush contacts the surface on which the machine travels, an attachment including a trailer frame having wheel support means, said trailer frame being detachably securable to the maintenance machine frame for towing behind said maintenance machine, a scrubbing solution dispensing tank on said trailer frame, a valve-controlled delivery tube for conveying scrubbing solution connected to the scrubbing solution tank and extendable forward to the front of said maintenance machine, a liquid distributing header detachably secured to the front of the maintenance machine frame connected to said delivery tube for receiving and distributing scrubbing solution, a closed collection tank on the trailer frame for holding recovered dirty scrubbing solution, means connected to the collection tank for inducing a partial vacuum therein, a squeegee mounted on the rear end of the trailer for engaging the surface over which the trailer moves, and a suction tube extending from the collection tank to adjacent the surface on which the trailer moves and mounted forward in respect to the squeegee for receiving an inflow of air and entrained used scrubbing liquid collected by the squeegee when a vacuum is induced in the collection tank, and a detachable scrub brush assembly having a frame, a drive motor in the last mentioned frame, a scrub brush drivenly connected to said drive motor, said machine frame at a front corner portion thereof and said assembly frame having cooperating means for removably mounting said assembly on the machine, said assembly being operable in both a machine mounted condition and a removed condition for scrubbing a floor surface.

2. The apparatus of claim 1 further characterized in that there is provided means connected to the valve means for applying cleaning solution to a location adjacent said scrub brush in a machine mounted condition and alternately in an assembly removed condition.

3. The apparatus of claim 2 further characterized in that said assembly includes a squeegee attachment mounted on said assembly frame.

4. Apparatus for scrubbing floor surfaces and the like comprising a floor maintenance machine having an operating guide wheel supported frame forming a downwardly opening brush enclosure, a power source on the machine frame, a brush connected to the power source to be driven thereby and journaled in said enclosure to rotate about a horizontal axis so that the brush contacts the surface on which the machine operates, a suction blower on said machine frame and drivenly connected to said power source, said suction blower having an inlet in fluid com-

munication with said enclosure and having an outlet, an attachment, said attachment including a trailer frame having wheel support means, means for detachably securing the trailer frame to the maintenance machine for towing said trailer frame, a first tank mounted on said trailer frame, a second tank mounted on said trailer frame adjacent said first tank, one of said tanks being a scrubbing solution dispensing tank and the other a collection tank, liquid distribution header means fluidly connected to scrubbing solution tank for distributing scrubbing solution adjacent said brush, means mounted on the rear of the trailer frame for collecting the scrubbing solution from the surface over which the trailer frame moves, a suction line extending from said collection tank to said collecting means for conducting scrubbing liquid collected by the collection means to the collection tank, and means connected to the collection tank for inducing a vacuum therein and thus to the suction line, and means removably attached to the suction blower outlet for restricting the flow of fluid through said outlet when the scrubbing attachment is attached to said maintenance machine.

5. The apparatus of claim 4 further characterized in that said trailer frame has a substantial portion overhanging said machine frame, that said first tank is mounted on said trailer frame portion and that the last mentioned means is a cover.

6. The structure of claim 5 further characterized in that said suction blower has an outlet, said outlet being located beneath said trailer frame portion when the trailer frame is attached to the machine.

7. In apparatus for scrubbing floor surfaces and the like including a floor maintenance machine having an operator guide wheel-supported frame forming a downwardly opening brush enclosure, a power source on said machine frame, a brush connected to the power source to be driven thereby and journaled in said enclosure with an axis of rotation transverse the normal direction of motion of the machine frame and positioned so that the brush contacts the surface over which the machine operates, a suction blower on the machine frame connected to the power source so as to be driven thereby and fluidly connected to the brush enclosure so as to be capable of drawing air therefrom, said suction blower having an outlet, the improvement comprising a scrubbing attachment including a trailer frame having wheel support means, means for selectively detachably securing the trailer frame to the maintenance machine to be towed thereby, said trailer frame having a portion overhanging a substantial portion of the maintenance machine including the suction blower outlet when the trailer frame is

attached to said machine, a first tank on said trailer frame portion, a second tank mounted on said trailer frame adjacent said first tank, one of said tanks being a scrubbing solution dispensing tank and the other a closed collection tank, liquid distribution header means connected to the scrubbing tank and adapted for distributing scrubbing solution adjacent said brush, means mounted on the rear of the trailer frame including a squeegee for collecting scrubbing solution from the surface over which the trailer frame moves, a suction line extending from the collection tank to said collection means to apply a vacuum adjacent the squeegee to induce the movement of scrubbing liquid collected by the collection means to the collection tank, and means connecting the suction blower of the collection tank for inducing a vacuum therein and thus to the suction line.

8. The apparatus of claim 7 further characterized in that the last mentioned means comprises a venturi attachment having a suction inelt connected in the suction blower outlet to produce a vacuum at said suction inlet and a vacuum conduit having one end fluidly connected to said suction inlet and an opposite end fluidly connected to the collection tank to apply a vacuum from the suction inlet to the collection tank.

9. The apparatus of claim 7 further characterized in that the suction blower has an inlet fluidly connected to the brush enclosure and that the last mentioned means includes a vacuum conduit having one end fluidly connected to said inlet and an opposite end fluidly connected to the collection tank for applying a vacuum to the collection tank.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,206,787 September 21, 1965

Alvin F. Daniels et al.

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 8, line 44, for "rubber" read -- tubular --; column 9, line 45, for "battery-operated" read -- battery-powered --; column 12, line 19, for "inelt" read -- inlet --.

Signed and sealed this 5th day of July 1966.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

EDWARD J. BRENNER
Commissioner of Patents